



# ASSESSING IN-SERVICE PHYSICAL SCIENCE TEACHERS' PERCEPTIONS AND THEIR EXPERIENCES ABOUT STUDENT-CENTERED APPROACH

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## ABSTRACT

This research paper reports the findings about Student-Centered approach (SCA) in Telangana from the practices and experiences of high school physical science teachers. The aim of the present study was to explore how the Student-centered approach (SCA) was perceived by Physical Science teachers (PSTs) and to what extent their actual classroom practices reflected this approach. The study utilised the both qualitative and quantitative methods were applied for data analysis and the data were collected through questionnaire and observation techniques. Multistage sampling technique was used for the study. At first stage, 200 Physical science teachers were taken from Khammam, Karimnagar and Warangal districts of Telangana state which covers male and female teachers, by random sampling. Class room observations were conducted from 30% of the selected teachers. The result showed that, most of the physical science teachers did not employ the prescribed student-centered approach in the high schools physical science lessons. Only very limited teachers were employing it. The inefficiency of some of the teaching-learning activities, physical characteristics of the classroom setting and duration of the allocated time for the activities were among the weak aspects of the SCA. The researcher recommends the need to address dilemmas in the implementation of SCA approaches such as: class sizes, curriculum design, and teacher shortage; shortage of instructional resources and facilities; and the medium of instruction; physical science curriculum should be designed to allow teachers' flexibility; and teachers' need of mastery in the substantive and syntactic knowledge. Other recommendations include: teachers' need of in-service training regarding the conceptual and theoretical understanding of SCA, its approaches, and application in physical science classrooms. Future studies should allow comparisons among teachers from different states across the country.

**KEY WORDS:** Experiences, Student-centered approach, practices.

## INTRODUCTION:

Over the past few decades, many universities, faculties, schools and departments of higher education in many parts of the world have been undergoing a significant pedagogical shift from a traditional teacher-centered approach to a student-centered approach in teaching and learning (Barr, R. B., & Tagg, J. 1995;). The traditional teacher-centered approach focuses on the teacher as the expert in transmitting knowledge to the student as the novice (Zohar, 2004). In contrast, the student-centered approach places the student at the centre of the learning process (Hesson & Shad, 2007) and is generally intended to provide students with the autonomy to actively seek out and construct meaning from information and previous experience (Weimer, 2002). This shift in teaching and learning from a teacher-centered approach to a student-centered approach is crucial; instead of concentrating on instruction (teacher-centered approach), the student-centered approach addresses the construction of learning by the student's own discovery and focuses on student learning outcomes.

Despite efforts to bring new teaching methods in education, conventional methods such as lecturing still being the most used methods in classroom physical science. Each individual has his own learning particularities. When teaching is based only in lecturing method without taking into account learners' learning characteristics the effectiveness of such teaching can be questioned. Traditional approach also fails to take into consideration the idea that teaching and learning might best occur when learners' needs and experiences are considered.

However, certain factors such as teaching culture, teachers' perceptions and beliefs could act as barriers for implementing new approaches to the teaching and learning of Physical science. Other aspects, such as overcrowded classrooms, extra-curricular responsibilities after teaching hours and low background training effect quality teaching in Physical science.

## Objectives of the study:

- To explore and understand physical science teachers' perceptions of the student-centered approach.
- To examine physical science teachers' perceptions of their classroom practices.
- To investigate the factors influencing how physical science teachers implement their perceptions of the student-centered approach in their actual classroom.
- To know the significant difference between the perceptions of: (i) male and female physical science teachers, (ii) ZP and Government physical science teachers, (iii) rural high school teachers and urban physical science teachers, (iv) experience and (v) three districts, with regard to student centered approach and their classroom teaching practices in high schools in Telangana state.

- To know the significant difference between the perceptions of: (i) male and female physical science teachers, (ii) ZP and Government physical science teachers, (iii) rural high school teachers and urban physical science teachers, (iv) experience and (v) three districts, with regard to limiting factors to attaining student centered science teaching approach in high schools in Telangana state.
- To know the relation between physical science teachers teaching approaches and limiting factors to attain the student centered science teaching approach in high schools in Telangana state.

## METHODOLOGY:

Both qualitative and quantitative methods were applied for data analysis. The researcher used questionnaire, classroom observations and focused group discussion, as its data collection tools. To collect the relevant data needed for the study, the researcher considered Physical science teachers (200) of Zilla Parishad and Government High Schools from khammam, karimnagar and Warangal districts of Telangana state which covers male and female teachers.

Multistage sampling technique was used for the study. At first stage, 200 PSTs were taken from the three districts by random sampling. Class room observations were conducted from 30% of the selected teachers.

The standardized questionnaire was taken by the researcher and after discussion with experts and supervisor certain changes were incorporated in the standardized questionnaire keeping in view control environmental differences. An observational schedule used that contained six events that occur in the classroom and the data were noted in an observational schedule. Focused Group Discussion (FGDs) with Physical Science Teachers: To capture the PSTs' full perceptions regarding their understanding of inquiry-based pedagogy in science, focus groups were organized

For this study, Dependent variables are: (a) Teaching Approach and (b) Limiting Factors; Independent variables: used for the study. (a) Gender, (b) type of the school, (c) Location, (d) experience and (e) District.

Validation and reliability questionnaire: The researcher presented the drafts to 18 experts in the field of education to assess the questionnaire for both content and construct validity. Thereafter, the questionnaire was pilot tested with physical science teachers from high schools situated in Warangal, Khammam, and Karimnagar districts of Telangana state. To ensure reliability of data obtained through observations, a tabular response on which each observed event was consistently and accurately registered in a correspondent category was used. Since structured observation yields a quantitative data, an inter-rate reliability was applied to measure the degree of consistency of the data.

The researcher personally visited each school and collected the data. Each PST was given a questionnaire and importance of the study was explained. The

respondents will be asked to fill up the questionnaire with necessary details by putting a tick (x) mark against the question according to their choice. The responses are 3 for Yes, 2 for some extent and 1 for No.

The data were also gathered using an observational guide that contained six events that occur in the classroom. The observation involved sixty (60) teachers and ranged from class 8th to 10th classes some were in the afternoon, while others were in the morning. In this research, the data were noted in an observational schedule. At this level, we sought to verify the frequencies of practices of student-centered events in classroom physical science by teachers. For this, a tabular response on which each observed event was consistently and accurately registered in a correspondent category was used. Then, the data were mapped for each category. This method enabled to find out the frequencies of observed situations for further comparisons. Teachers' teaching activities in classroom were the unity of analysis. The research included grade 8 to 10.

In this particular research, the data were collected through questionnaire, Focused Group Discussion and observation techniques. The data was collected and analysed by using descriptive statistical techniques like mean, standard deviation, and inferential statistics, like chi-square, student t-test and ANOVA. For analysing the data the SPSS package 19th version was utilised.

## CONCLUSIONS AND SUGGESTIONS:

### Conclusions:

- (a) The probability of shifting from one category response (yes to some extent) to another, student and teacher-centered statements is not significant. Therefore, the type of school of physical science teachers working could not account for teachers' perceptions of student and teacher-centered approach. We conclude that teachers' level of response in almost all statements (student and teacher-centered statements) do not vary due to the type of school each has working.
  - (b) Teachers with teaching experience of up to ten years of teaching seem to have mixed perceptions concerning some statements. In some cases, the probability of shifting from the category strongly disagrees, to strongly agree, regarding statements related to student and teacher-centered teaching, seems to be affected by teachers' teaching experience, and is therefore significant. These would lead to a conclusion that teachers' perceptions in those statements can be explained by number of years of experience in teaching physical science in education. However, in general teachers' teaching experiences seem to have no effect on the category responses (no to yes) since the majority of them did not show significant effect of teacher teaching experience on their perceptions of student and teacher-centered teaching.
  - (c) The study has concluded that teachers' professional experience, as well as the type of school did not affect the type of approach (student or learner-centered approaches) teachers' use in classroom physical science. Teachers of high school prefer to use both approaches when they teach physical science.
  - (d) The research has also concluded that teachers during physical science lessons communicate less and they spend more time with few learners, while the majority of learners have no activities to do whatsoever during lessons.
  - (e) Communication was unilateral, that is, it started always from teacher to students, not the opposite. Learners were not prompted to comment or ask questions neither of the teacher nor of themselves. Learners spent most of their time working on assignments in their exercise books, than working in groups or on the chalkboard. Teachers did not ask questions that required learners to describe and explain a given physical science problem
- Most of the physical science teachers did not employ the prescribed student-centered approach in the high schools physical science lessons. Only very limited teachers were employing it.
  - Most of the school laboratories were not fully equipped in terms of equipment, furniture, specimen, apparatus, and chemicals, etc. Most of the school laboratories were either in disrepair or under construction, as a result, some lessons were held in inappropriate rooms.
  - Schools did not have qualified technicians or at least laboratory assistants to manage the laboratories or assist teachers in class.
  - The science teachers showed little evidence of adequately doing pre-planning for student-centered approach activities. They did not show any evidence of having a lesson plan in class, except for lesson notes.
  - In very few cases students were allowed to work independently or in small groups.
  - Most of the science teachers did not use a variety of highly recommended teaching methods such as inquiry, demonstration, practical work, project work, case study, field trips, discussions, computer guided learning.

- In most lessons, there was little evidence of increased participation in class of all groups of learners.
- In some instances, students were being exposed to practical application of science in everyday life, through using the local environment and context.
- Most of the teachers were not making effort to inculcate the recommended processes skills of using and organizing apparatus and materials, collecting data, handling experimental observations and data, and planning for investigation. Those who did were very successful in achieving their objectives.
- Most of the teachers carried out demonstrations as an end in themselves or in preparing the students to carry out their own group or individual practical work.
- Most of the teachers effectively used a variety of teaching aids in their lessons. These were both commercially and teacher-made aids.
- The skill of asking questions and giving well-thought out answers was not being developed in students. Most of the questions asked by teachers and students were of low order level.
- Most of the teachers did not provide a conducive environment for asking and answering questions during the lesson.
- Despite the insistence of the SCERT syllabi that hands-on type of learning be implemented, most science teachers did not practice it.
- Most of the science teachers were not implementing the recommended assessment procedures for course work.

### Suggestions :

According to the research findings, the study presents some suggestions as follows:

In-service teachers need continual training regarding constructivist SCA and its application in different classrooms' contexts; The findings obtained from this study lead to the recommendation that the curriculum at teacher training institutions must focus on methodologies that enhance the use of learner-centered teaching so that teachers can understand them and therefore change their perceptions. Practices during training should focus on the use of active methods in physical science so that teachers may understand how to apply the in classroom practices.

There is a need to address dilemmas in the implementation of SCA approaches. The dilemmas include: class sizes and curriculum design; shortage of instructional resources and facilities; and the medium of instruction; the physical science curriculum should be designed in a way that allows for teachers' flexibility and that teachers should also be trained to implement such a curriculum. The idea for a flexible curriculum is to support teachers to use SCA methods based on students' geographical and cultural contexts; Teachers' need of mastery in the substantive and syntactic physical science knowledge to enhance implementation of SCA approaches;

- Teachers' need of in-service training regarding a conceptual and theoretical understanding of SCA, its approaches, and application in physical science classrooms;
- The need to address and harmonise the complexities and contradictions that adversely affect the effective implementation of SCA approach in India's physical science classrooms.
- The in-service unit of the school Education, should equip science teachers in order to employ the prescribed student-centered approach; involving laying emphasis on the science process skills, problem-solving skills and the acquisition of hands-on experience; teacher-centered or a mixture of the two approaches is not being practiced in the senior secondary schools.
- The school education department should revamp science laboratories in terms of their structures, furniture, materials and chemicals and human resources so that teaching and learning can take place more effectively.
- Regarding research in science education, this study suggests that there are some teachers who still do not have a clear understanding of the benefits of the student centered approach over the non-student-centered approach. None of the teachers in this study could give an in-depth explanation about how and why the student-centered approach works effectively with students. Moreover, they believe that the student centered approach is good and effective only for students in an ideal classroom and that it is not applicable for their students. Thus, these teachers need evidence that the student centered approach is practical and effective in the real classroom. There is a need for more research addressing this issue.

This study suggests three important tasks that should be done immediately by

these agencies.

- First, the student centered approach should be promoted by referring to the notion of finding the most efficient way to educate students rather than the notion of changing lecture-based instruction to a physically active learning activity. The teachers with the student-centered heart should be reinforced and supported even though they still majorly adopt lecture based pedagogy in their practices.
- The second task is to help teachers understand learning not as knowledge acquisition but instead as knowledge construction. Teachers should be made aware of the importance of students' prior knowledge, experiences, motivations, affects, and interactions with their peers in student learning. Moreover, they should be informed about the current trends in science education such as scientific inquiry, inquiry-based instruction, conceptual change theory, and the nature of science. This information would help them to develop and modify their views of science teaching and learning to those that are aligned with the student-centered principles.
- Finally, teachers should be encouraged to form communities of practice. They should have a place to share and exchange knowledge, ideas, experiences, and feedback in a supportive atmosphere. This task might start with forming the community of the Physical Science teachers and then expanding to other groups of the teachers.

#### Scope further research

The study focused only in schools from three districts, namely Khammam, Karimnagar and Warangal of Telangana State. Future studies should allow comparisons among teachers from different states across the country. The areas of research interest might include: the implementation of SCA in Science curriculum in general or in a subject area other than physical science. There is a need for a further study with different groups of teachers to verify and expand the results of the current study. The possible groups of teachers included pre-service teachers. More research should be done regarding teachers' physical science beliefs to measure how teachers perceive their own knowledge of student-centered approach and how they practice it. The sample used in this study contained Zilla Parishad High Schools and Government High School respondents. Future studies should focus on how other High Schools teachers perceive student-centered teaching in physical science.

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